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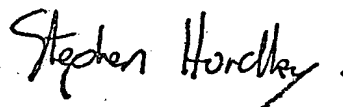


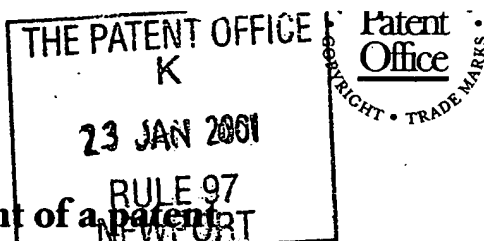
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25 JAN 01 E600785-2 C26047
P01/7700 0.00-0101927.2

The Patent Office

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(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

Cardiff Road
Newport
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NP10 8QQ

1. Your reference

0100110

2. Patent application number

(The Patent Office will fill in this part)

23 JAN 2001

0101927.2

3. Full name, address and postcode of the or of each applicant (*underline all surnames*)

SMITHS GROUP PLC
765 FINCHLEY ROAD
LONDON
NW11 8DS

Patents ADP number (*if you know it*)

728708002

08032310001

If the applicant is a corporate body, give the country/state of its incorporation

GB

4. Title of the invention

PIPE COUPLINGS

5. Name of your agent (*if you have one*)

J. M. FLINT

"Address for service" in the United Kingdom to which all correspondence should be sent (*including the postcode*)

765 FINCHLEY ROAD
LONDON
NW11 8DS

Patents ADP number (*if you know it*)

1063288002

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (*if you know it*) the or each application number

Country

Priority application number
(*if you know it*)

Date of filing
(*day / month / year*)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(*day / month / year*)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (*Answer 'Yes' if:*

YES

a) any applicant named in part 3 is not an inventor, or

b) there is an inventor who is not named as an applicant, or

c) any named applicant is a corporate body.

See note (d))

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form

Description 6

Claim(s)

Abstract

Drawing(s) 2 + 2 *en*

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination (*Patents Form 10/77*)

Any other documents
(please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature

Date

22/01/01

12. Name and daytime telephone number of person to contact in the United Kingdom

J.M. FLINT 020 8457 8220

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PIPE COUPLINGS

This invention relates to pipe couplings and assemblies.

Connection to a corrugated pipe or conduit can be made by means of a coupling in which the end of the pipe is inserted, the coupling having a locking member in the form of a resilient tooth that engages between corrugations to prevent the pipe and coupling being pulled apart after assembly. The coupling may have a tapering bore forming a close fit with the outside of the pipe so as to seal the pipe with the coupling. Couplings of this kind are described, for example, in US5094482, US5041256, GB2225550, US5150930 and US4923227 and are sold by Adaptaflex Limited of Coleshill, Birmingham, UK. Although the seal provided by these couplings is satisfactory in many situations, there are some applications where a more effective seal is needed.

It is an object of the present invention to provide an alternative pipe coupling and assembly.

According to one aspect of the present invention there is provided a coupling for a pipe, the coupling including a housing and retaining means for retaining the pipe within the housing, the housing having a bore extending therethrough, the coupling including a seal member of a relatively deformable material moulded into the bore, the seal member being of annular shape and adapted to seal with the external surface of the pipe inserted in the bore.

According to a further aspect of the present invention there is provided an assembly of a coupling and a pipe, the coupling including a housing and retaining means retaining the pipe within the housing, the housing having a bore extending therethrough in which the pipe extends, the coupling including a seal member of a relatively deformable material moulded into the bore, the seal member being of annular shape and sealing with the external surface of the pipe.

The seal member preferably has at least one annular projection around its inner surface adapted to locate between corrugations on the external surface of the pipe. The seal member may have a portion extending over an annular shoulder on an external surface of the housing to form a seal with a member to which the coupling is attached. The retaining means may be formed integrally with the housing. The coupling may include a retaining cap fitted on the housing to engage the retaining means.

A coupling and an assembly of the coupling on a conduit according to the present invention, will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a sectional side elevation view of the coupling before assembly;

Figure 2 is a sectional side elevation view of the coupling and conduit when fully assembled;

Figure 3 is a side elevation view of an alternative coupling before assembly; and

Figure 4 is a sectional side elevation view of the coupling of Figure 3 after assembly.

With reference first to Figures 1 and 2, the assembly comprises a conduit 1 and a coupling 2 fitted on the right-hand end 10 of the conduit.

The conduit 1 is entirely conventional and is of a rigid but bendable plastics material with a circular section and has corrugations 11 and 12 on its external and internal surface 13 and 14 respectively. The right-hand end 10 of the conduit 1 is cut square.

The coupling 2 comprises two parts joined with one another, namely a body or housing 20 and a seal member 21. The housing 20 is similar to previous housings, being a single-piece moulding of a rigid plastics material of substantially tubular shape. The housing 20 has a bore 22 extending axially along its length and divided into three portions, namely an entrance portion 23, an intermediate portion 24 and an exit portion 25. The entrance portion 23 at the left-hand end of the housing 20 has a constant diameter slightly greater than the external diameter of the conduit 1. The intermediate portion 24 has a diameter smaller than that of the entrance portion 23 and of the same diameter or slightly larger than the external diameter of the conduit 1. At its right-hand end, the portion 24 has a shallow groove 34. The exit portion 25 has a reduced constant diameter and is separated from the intermediate portion 24 by an internal step 26. Towards its left-hand end, the housing 20 is formed with retaining means in the form of two locking arms or catches 27 and 28 each having an inwardly-extending tooth 29 at its free, right-hand end. The coupling could have any number of one or

more locking arms. The left-hand end of each arm 27 and 28 is attached with the housing 20 by a hinge portion 30 of reduced thickness, which enables the arms to be flexed resiliently outwardly. The natural position of the locking arms 27 and 28 is extending slightly inwardly, as shown in Figure 1. The outside of the housing 20 has flats 32 in the region of the intermediate portion 24 to enable the housing to be gripped by a spanner. The forward, right-hand end of the housing 20 has an external screw thread 33 by which the coupling 2 can be screwed into a cooperating female coupling (not shown). Instead of a screw thread, the housing could have other forms of fixing formation, such as barbs or spring catches. Externally, the housing 20 has a forwardly-facing face or ledge 40 between its threaded and intermediate portions.

The seal 21 is of a deformable, resilient thermoplastics material and is moulded into the housing 20 into the groove 34 in the intermediate portion 24 via two or more holes 35 through the wall of the housing in the region of the step 26. Preferably, this is achieved using a two-shot injection moulding process so that the seal is formed by the same machine that moulds the housing. The seal 21 is of annular shape and circular section comprising a sleeve 36 having two internal ribs or annular projections 37 spaced by a small distance axially from one another such that they locate on opposite sides of an external corrugation 11 on the conduit 1. The seal could have a smooth internal surface and make an interference fit with the outside of the conduit. Two or more sprues 38 of the seal extend through the holes 35 and link with a flange portion 39 of circular section located on the ledge 40. This flange portion 39 provides a washer or seal with the end of a cooperating coupling (not shown) screwed onto the threaded portion 33. Alternatively, the flange portion 39 may seal against the face of a panel around an opening through which the coupling extends. This flange portion 39 can be

omitted or provided by a separate component. Because the seal 21 is moulded into the housing 21, it is securely bonded with it and forms an effective seal with the inside of the housing.

In use, the coupling 2 is provided as a single component. The user simply pushes the forward end 10 of the conduit 1 into the rear end of the housing 20, as shown in Figure 2, so that the teeth 29 on the locking arms 27 and 28 ride over corrugations 11 on the conduit. The forward end 10 of the conduit 1 deforms the seal 21 outwardly slightly as it is pushed into the seal and the ribs 37 locate on opposite sides of the first corrugation 11 on the conduit or between two adjacent corrugations. Rearward movement of the conduit 1 is prevented by the locking arms 27 and 28, which engage the conduit 1 more tightly as force is applied. The conduit 1 holds the material of the seal 21 compressed between the outside of the conduit and the inside of the housing 20 to provide an effective seal. This is enhanced by the labyrinth effect of the ribs 37 and the corrugations 11.

This arrangement enables an effective seal to be provided without the need for separate components.

The coupling could take alternative forms, such as shown in Figures 3 and 4. In this arrangement, the coupling comprises three parts, namely a housing 120, a seal member 121 and a retaining cap 122. The housing 120 has an array of twelve short claws 123 at its rear end each of which has an inwardly-directed finger 124 the tip of which, in its natural state, just clears the outside surface of the conduit 10 during insertion. The coupling could have different numbers of claws. On its outer surface, the housing 120 has two rounded annular

ribs 125 located forwardly of the claws 123. The seal member 121 is identical with the seal 21 in the coupling shown in Figures 1 and 2 and is moulded into the housing 120 in the same way. The cap 122 is of cylindrical form having a rear end 126 tapering inwardly both externally and internally. The cap 122 has an internal screw thread 127, which engages a thread 125 on the housing. After the conduit 10 has been fully pushed into the housing 120 to engage the seal 121, the cap 122 is screwed onto the housing 120, so that its tapered end 126 bears against the outer edge of the ends of the arms 123 and pushes them slightly inwardly between adjacent corrugations of the conduit. The cap 122 retains the arms 123 in engagement with the conduit and prevents it being pulled from the housing.

It will be appreciated that the invention is not limited to use with conduits but could be used on other forms of pipe. Alternative locking means could be used, such as with uncorrugated pipes.

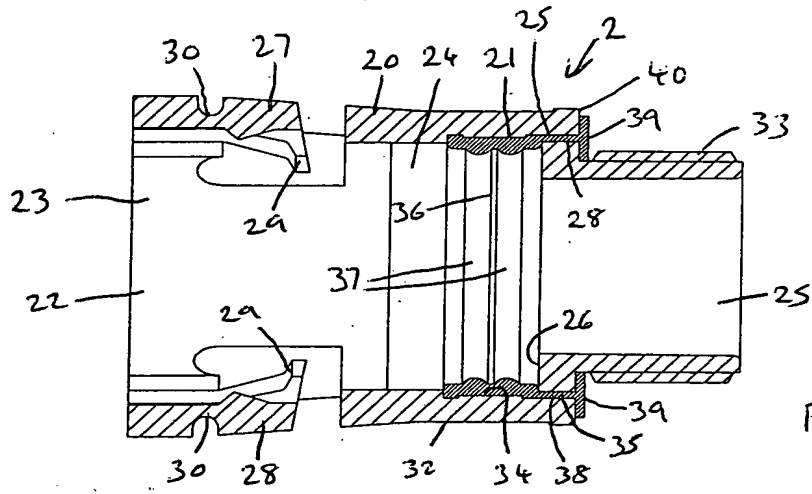


FIG. 1

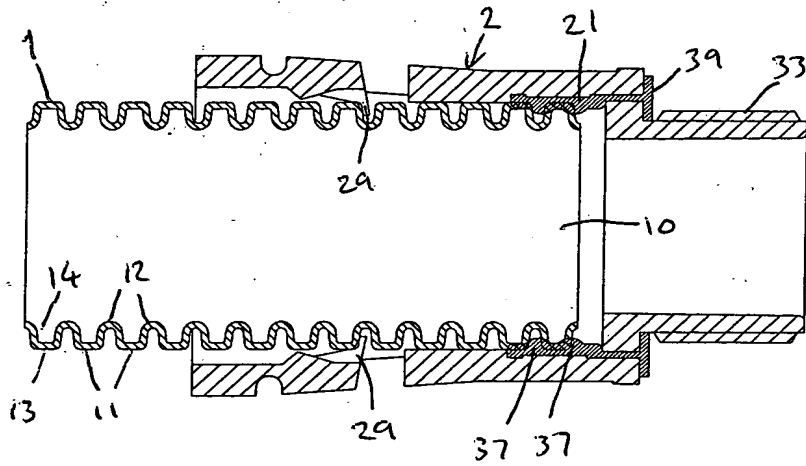


FIG. 2

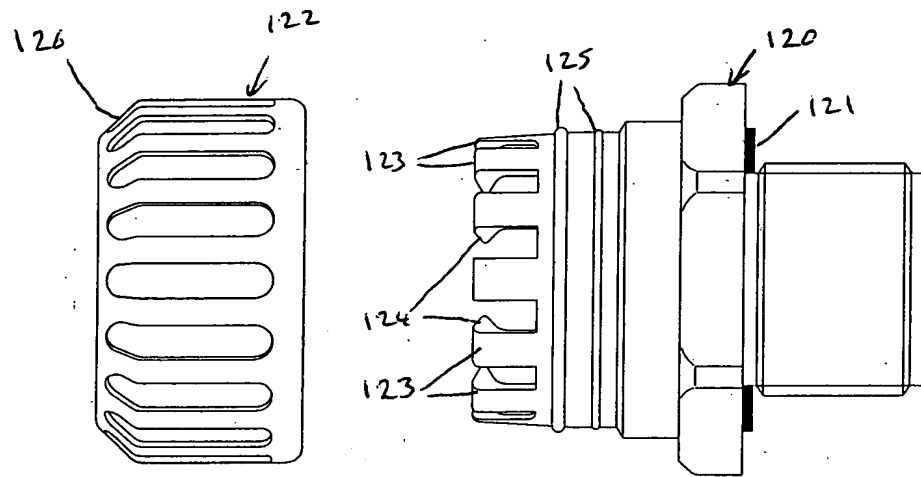


FIG. 3

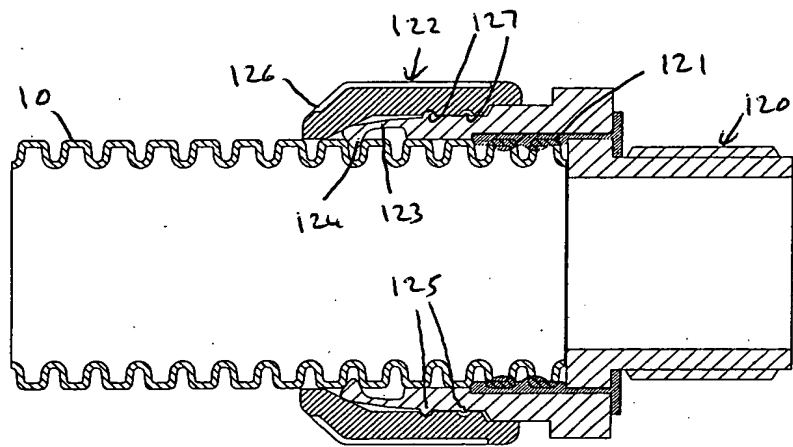


FIG. 4